TECHICAL UNIVERSITY OF MOMBASA

Faculty of Engineering & Technology

DEPARTMENT OF BUILDING & CIVIL ENGINEERING

UNIVERSITY EXAMINATION FOR:
BACHELOR OF SCIENCE IN CIVIL ENGINEERING

ECE 2405: IRRIGATION ENGINEERING II

SPECIAL/SUPPLEMENTARY EXAMINATION
SERIES: FEBRUARY 2013
TIME: 2 HOURS

Instructions to Candidates:
You should have the following for this examination
- *Answer Booklet*

This paper consists of **FIVE** questions.
Answer question **ONE (COMPULSORY)** and any other **TWO** questions
Maximum marks for each part of a question are as shown
This paper consists of **THREE** printed pages

Question One (Compulsory)

a) Give the comparisons between a Barrage and a weir in irrigation systems. **(10 marks)**

b) Calculate the crest level of main weir and under sluice for a gated diversion structure for the following data. **(10 marks)**

$Q\max = 1000$ *cumecs*

$H.F.L = 100m$

$f = 0.1$

Length of barrage, $L = 200m$

c) Summarize the need for irrigation in four points. **(5 marks)**

d) How is Brick lining of Canals done? **(5 marks)**

Question Two

a) Outline **FOUR** positive points for the proper site for drainage crossing. **(10 marks)**

b) Compare the advantages and disadvantages of brick lining. **(10 marks)**

Question Three

a) Why is a free board of a canal required? **(5 marks)**

b) Discuss the most commonly used canal cross-section in irrigation and drainage with the aid of a diagram. **(15 marks)**

Question Four

A single-acting reciprocating pump, running at 50r.p.m delivers $0.00736m^3/s$ of water.

The diameter of the piston is 200mm and stroke length 300mm. The sunction and delivery heads are 3.5m and 11.5m respectively.

Determine:

(a) Theoretical discharge **(5 marks)**
(b) Coefficient discharge **(3 marks)**
(c) Percentage slip of the pump **(5 marks)**
(d) Power required to run the pump **(7 marks)**

Question Five

a) A single acting reciprocating pump operating at 120rpm has a piston ϕ of 200mm and stroke of 300mm.

The sunction and delivery heads are 4m and 20m respectively. If the efficiency of both sunction and delivery strokes is 75%. Determine the power required by the pump. **(10 marks)**

b) A pelton wheel having a mean bucket diameter of 1.2m is running at 1000rpm

The net head on the pelton wheel is 840m. If the side clearance angle is 15^o and discharge through the nozzle is $0.12m^3/s$. Calculate:

(i) Power available at the nozzle and **(5 marks)**
(ii) Hydraulic efficiency of the turbine **(5 marks)**